(12) UK Patent (19) GB (11) 2079669 B

(54) Title of invention

Intumescent fire seals

(51) INT CL³; B29D 31/00 B29F 3/10 3/12

(21) Application No
8120163

(22) Date of filing
30 Jun 1981

(30) Priority data

(31) 80/21493

(32) 1 Jul 1980

(33) United Kingdom (GB)

(43) Application published
27 Jan 1982

(45) Patent published
13 Feb 1985

(73) Proprietor
Lorient Polyproducts Limited,
73 Lynwood Drive
Mytchett
Camberley
Surrey

(72) Inventor
R. Mann

(74) Agent and/or
Address for Service
Eric Potter & Clarkson,
14 Oxford Street
Nottingham NG1 5BP

(52) Domestic classification
B5A 1R150 1R214F 1R214U
1R314C1E 1R408 2A2 2A3 T17P
E1J GN

(56) Documents cited
GB 1363161
GB 1298823
GB 1292893
GB 1238336
GB 1151091
GB 0896150
GB 0812564
GB 0810287
GB 0772092
GB 0642711
GB 0480354
GB 0374160
GB 0147522
US 3566541

(c ntinued n n xt pag)

GB 2079669B

(58) Field of search
B5A

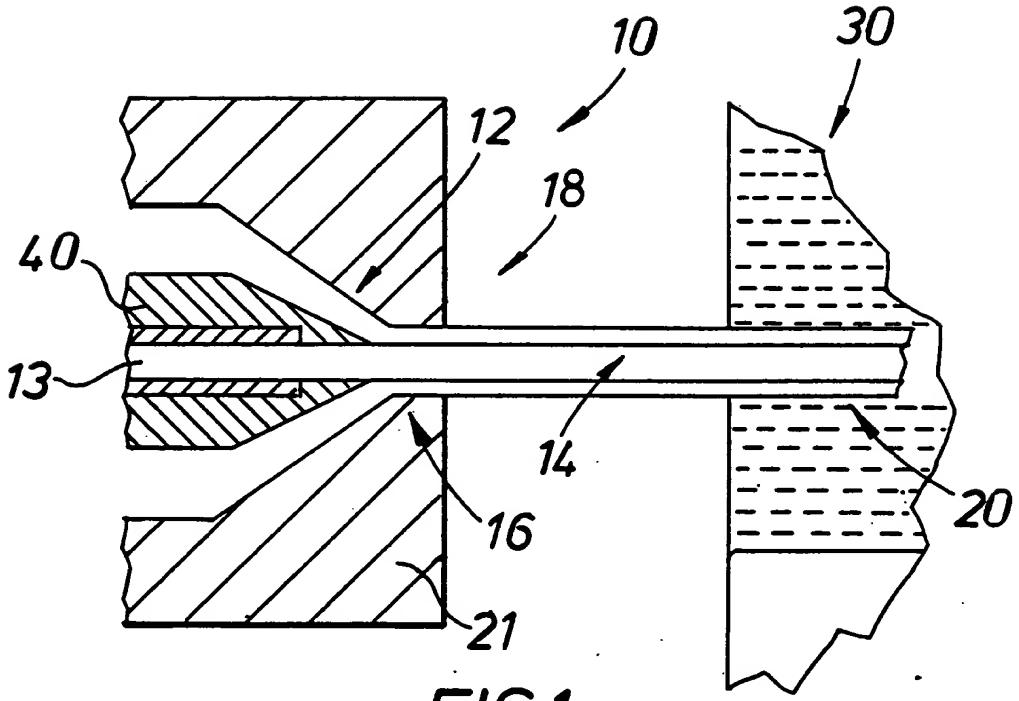

FIG.1

INTUMESCENT FIRE SEALS

The present invention relates to intumescent fire seals and more particularly relates to a process and an apparatus for producing intumescent fire seals.

Fire seals having an intumescent strip encased in a plastics cover, usually of polyvinylchloride, are known. Construction of these seals is achieved by extruding the casing, inserting strips of the intumescent material into the casing and then securing the intumescent strips therein using an adhesive. The intumescent material, such as "Palusol" (Registered Trade Mark) is normally supplied in sheets and has to be cut into strips.

Producing intumescent seals in this way is undesirable since it is labour intensive and during cutting exposes the edges of the intumescent strip to the atmosphere which can result in adsorption of moisture which causes deterioration of the intumescent mateial. Accordingly, prior to insertion of the strip into the cover, the edges have to be coated with a barrier material which prevents adsorption of moisture.

It is a general aim of the present invention to provide a process for the production of an intumescent fire seal which avoids the above mentioned drawbacks.

According to one aspect of the present invention there is provided a process for producing an intumescent fire seal which comprises the steps of extruding a core of intumescent material and extruding a cover which encapsulates the extruded core of intumescent material. According to another aspect of the present invention there is provided an apparatus for the production of an intumescent fire seal as defined above which comprises a first die head for extruding the core of intumescent material, a second die head spaced from the first die head and arranged to extrude the cover to encapsulate the core and cooling means intermediate the first and second die heads for cooling the extruded core before feeding through the second die head.

According to another asepct of the present invention

there is provided an apparatus for the production of an intumescent fire seal as defined above which comprises a die head having first and second dies, the first die being arranged for extruding the core of intumescent material and the second die being arranged to extrude the cover to encapsulate the core, the die head being provided with a heat insulating layer to insulate the intumescent material prior to extrusion thereof and cooling means downstream of the die head for cooling the extruded core and encapsulating cover.

Extrusion of the core and cover may be performed separately using separate die heads, a first die head producing the core of intumescent material which is then cooled

and fed through a second die head which produces the covering. When the intumescent material used is "Palusol", some disorientation of the glass fibre reinforcing agent included in the "Palusol" may occur and it may be necessary to re-orient the fibres to be parallel to the surface of the extruded core. This may conveniently be achieved by performing a rolling, flattening and/or stretching operation on the "Palusol" extrudate after it issues from the first die head but before encapsulation by the cover, for example before feeding thereof into the cross-head of the second die head. Alternatively, the core and cover may be produced within the same die head having two extruding dies, a first die for producing the core of intumescent material and a second die downstream from the first die and which produces the covering.

The rate of feed of the intumescent core through the second die is controlled so as to ensure that the heat adsorbed by the intumescent material is insufficient to cause the intumescent material to intumesce. If the intumescent material used is "Palusol" it is generally preferred, however, to employ two die heads as described above.

Other aspects of the present invention will now be described with reference to the sole accompanying drawing, which is a schematic longitudinal section through part of an extruder die assembly according to the present invention.

The process according to the present invention is hereinafter described using hydrated sodium silicate, for example of the type sold as "Palusol" as the intumescent material and polyvinylchloride as a suitable plastics material for forming the cover. It will be appreciated however that other suitable intumescent materials and plastics materials may be used if desired.

As seen in the drawing, the die assembly 10 includes a first die 12 which extrudes the intumescent material 13 to form a core 14. The core 14 passes through a chamber 16 and through a second die 18 which extrudes a cover 20 from

polyvinylchloride 21. The intumescent material intumesces at 100°C if exposed to that temperature for a sufficient time to cause boiling of water contained therein. In the present instance exposure to a temperature in excess of 100°C for more than 2 seconds is sufficient time to cause intumescence to occur.

Accordingly, the rate of flow of intumescent material through the die assembly is chosen to ensure that the intumescent material travels from the first die, out of the second die and into a cooling bath 30 to attain a temperature below 100°C within a time period less than the activation period of the intumescent material, in this case in less than 2 seconds. Preferably the intumescent material is cooled within the bath to a temperature below 100°C within ½ to 1 second after leaving the first die.

The intumescent material 14 is extruded at the lowest temperature possible, approximately 80°C, and in order to protect it from heat conduction from the molten polyvinylchloride (which is at a temperature of about 175°C) a heat insulating layer 40 is provided to insulate the intumescent material prior to extrusion.

The distance between the first and second die is chosen to be a minimum bearing in mind that the distance should be sufficient to enable the polyvinylchloride to adhere to the core material without the creation of air gaps.

An intumescent strip formed in accordance with the above process possesses a core of intumescent material which is protected by the cover from the ingress of moisture and also carbon dioxide both of which cause deterioration of the intumescent material.

CLAIMS

1. A process for producing an intumescent fire seal which comprises the steps of extruding a core of intumescent material and extruding a cover which encapsulates the extruded core of intumescent material.

2. A process as claimed in Claim 1 wherein extrusion of the core and cover is performed separately using separate die heads.

3. A process as claimed in Claim 2 wherein extrusion of the core is performed in a first die head and the thus formed core is cooled and then fed through a second die head for production of the covering.

4. A process as claimed in Claim 3 which further comprises rolling, flattening and/or stretching the extruded core of intumescent material before feeding thereof through the second die head.

5. A process as claimed in Claim 1 wherein the core of intumescent material and the cover are produced within a single die head having a first die for extruding the intumescent material and a second die for extruding the covering.

6. A process as claimed in Claim 5 which further comprises insulating the intumescent material prior to extrusion thereof by providing the first die with a heat insulating layer.

7. A process as claimed in any of Claims 1 to 6 wherein the core and cover are cooled after encapsulating the core with the cover.

8. A process as claimed in any of Claims 1 to 7 wherein the intumescent material comprises hydrated sodium silicate.

9. A process as claimed in Claim 8 wherein the intumescent material is extruded at a temperature of about 80°C.

10. A process for producing an intumescent fire seal substantially as herein described with reference to the accompanying drawing.

11. An apparatus for performing the process according to Claim 1 including a first die head for extruding the core of

intumescent material, a second die head spaced from the first die head and arranged to extrude the cover to encapsulate the core and cooling means intermediate the first and second die heads for cooling the extruded core before feeding through the second die head.

12. An apparatus as claimed in Claim 11 which further comprises rolling, flattening and/or stretching means positioned intermediate the first and second die heads for rolling, flattening and/or stretching the extruded core before feeding thereof through the second die head.

13. An apparatus for performing the process according to Claim 1 including a die head having first and second dies, the first die being arranged for extruding the core of intumescent material and the second die being arranged to extrude the cover to encapsulate the core, the die head being provided with a heat insulating layer to insulate the intumescent material prior to extrusion thereof and cooling means downstream of the die head for cooling the extruded core and encapsulating cover.

14. An apparatus for the production of an intumescent fire seal substantially as herein described with reference to and as shown in the accompanying drawing.